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ADVISORY CIRCULAR

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

SUBJECT: ADDITIONAL WEATHER INFORMATION: DOMESTIC AND FLAG AIR CARRIERS

1. PURPOSE. This advisory circular provides guidance and standards to domestic and flag air carriers for approval of a system for obtaining forecasts and reports of adverse weather phenomena. The material contained in this circular is not intended to be all encompassing. It is expected that each airline will tailor its weather system to its operational requirements.

2. REFERENCES. Federal Aviation Regulations 121.99, 121.101, 121.601; Advisory Circulars 00-6A, 00-45A and 00-50.

3. BACKGROUND. A number of airline accidents continue to have weather as a cause or a factor. For the years 1970 through 1975, the National Transportation Safety Board attributes weather as a cause or a factor in almost 48 percent of U.S. air carrier accidents. The National Weather Service (NWS) has the responsibility within the United States for providing aviation weather services. Foreign governments and our U.S. Air Force Air Weather Service also provide aviation weather services. The application of these services is then up to the users. The effectiveness of a carrier's weather reporting system has a direct relationship to how well its meteorological/dispatch organization can customize, adapt and add to the weather services. Also, the ability of the carrier to provide useful and timely weather information to its flightcrews has a direct relationship to the effectiveness of the system.

4. GENERAL.

a. The Federal Aviation Regulations (FAR) require that each domestic and flag air carrier shall adopt and put into use an approved system for obtaining forecasts and reports of adverse weather phenomena, such as clear air turbulence (CAT), thunderstorms and low altitude wind shear, that may affect safety of flight on each route to be flown and at each airport to be used.

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b. The FAR's also require that before beginning a flight, the aircraft dispatcher shall provide the pilot in command with all available weather reports and forecasts of weather phenomena, including adverse weather phenomena, such as clear air turbulence, thunderstorms and low altitude wind shear, for each route to be flown and each airport to be used. During a flight, the aircraft dispatcher must provide the pilot in command any additional available information of meteorological conditions, including adverse weather phenomena, such as clear air turbulence, thunderstorms and low altitude wind shear, and irregularities of facilities and services that may affect the safety of the flight.

c. An approved airline weather system should be tailored to the types of operations it conducts. The approved airline system should provide timely, useful and valid weather information to its flightcrews. The following paragraphs address these subjects:

(1) Timely Information. A very important element of an airline weather system is the ability to rapidly transmit and receive weather information as required by FAR, Section 121.99. Today's technology provides us with the ability to rapidly communicate over long distances. Additional adverse weather information should go from the dispatch/meteorology office to the pilot in command without excessive delay. Insofar as today's technology allows and when the need arises, the airline air/ground communications system should enable the dispatcher/meteorologist to rapidly advise the pilot in command of additional adverse weather so that appropriate action may be taken.

(2) Usable Information.

(a) Both preflight briefings and in-flight advisories should relate the position of hazardous weather to a point that can be readily located by the pilot while in flight. For example, while it may be convenient for the dispatcher/meteorologist to use states, cities and towns to locate hazardous weather, from the cockpit the air carrier pilot normally relates better to azimuth and distance from navigation aids.

(b) FAR 121.419(a)(iii) and (vi) requires flightcrew training for the weather hazards addressed in this circular. Appropriate evasive maneuvers when encountering CAT or thunderstorms should be a part of the training. To achieve the best results from the training the dispatcher/meteorologist should, when possible, tell the pilot what phenomenon is causing expected CAT.

(c) The terms used in giving the pilot weather information should be those used in the airline pilot training programs. For example, if the pilots are not familiar and cannot readily convert millibars to feet, height should be given in feet. Other examples are standing wave versus mountain wave and upper front versus jet front.

(3) System Validity. The field of meteorology is not known to be an exact science. For example, we are not able to precisely predict the intensity of a thunderstorm. Numerous other examples can be given. By use of objective techniques and a good data base, however, excellent results may be achieved. There are proven predictive procedures that make certain facets of meteorology approach that of an exact science.

(a) Each airline should have a program to evaluate its weather system efficiency. It is important that the pilot be a part of the validation of an airline weather system. For example, while CAT may be predicted, only the flight crewmembers can confirm or deny that turbulence occurred.

(b) Organized pilot input, if weather conditions are other than predicted, is important to an airline in the determination of its weather system efficiency. In addition, pilot reports can help the weather prediction for following flights and can also help the airline to refine its predictive techniques.

5. WEATHER HAZARDS.

a. Clear Air Turbulence. CAT associated with tropopause surfaces, mountain waves, troughs and upper (jet) fronts is routinely predicted. This allows airlines to provide their flightcrews with best routes and/or altitudes to avoid in-flight turbulence hazards.

(1) Mountain Generated. For years meteorologists have been successful in predicting hazardous mountain wave activity. Mountain wave deviation routes are now published as jet routes for the 48 contiguous states to facilitate routing. Domestic and flag air carriers should use available products and techniques to anticipate hazardous mountain wave activity for their routes. Prediction of these areas should have high reliability.

(2) Other CAT (tropopause surfaces, troughs and upper [jet] fronts). Meteorologists are experiencing success in predicting hazardous turbulence associated with non-mountain generated CAT. Airlines should use available weather products and techniques to anticipate hazardous non-mountain generated CAT. Prediction of location and altitudes for this CAT may not be as good as for mountain waves. Prediction should, however, have good reliability.

b. Low Level Wind Shear. Since airline dispatch/meteorology procedures will differ regarding the two primary phenomena that cause hazardous low level wind shear, they should be addressed separately.

(1) Thunderstorm Gust Front. A thunderstorm's movement and its normal short-life cycle generally make gust front time frame alerting by an airline dispatcher/meteorologist a very difficult procedure. Usually their best effort is to use available weather services products and other pilot reports to alert the flightcrews of the possibility or probability of thunderstorms in the vicinity of the airport.

(2) Fronts. Significant low level wind shear that is caused by warm or cold fronts gives the airline dispatcher/meteorologist a better opportunity to fix the shear in time and space than do gust fronts. Established techniques are routinely used by meteorologists to identify potential low level wind shear hazards. Flightcrews should be made aware of anticipated significant frontal low level wind shear.

c. Thunderstorms. Numerous products are available from the NWS concerning thunderstorms. Such products as the SIGMET (WS), the Severe Weather Outlook Chart, the U.S. Low Level Significant Weather Prognostic Chart and the Convective Outlook (AC) can give an overview of possible thunderstorm activity. The overview should be updated by pilot reports, the Radar Summary Chart and Radar Reports, SIGMETS and, if available, Dial Up Radar (WBRR) and satellite products. The pilot in command should be made aware of the prediction and of actual thunderstorm activity along his route of flight. Using the products that are made available by the weather services, the airlines should alert its affected flightcrews of pertinent available thunderstorm information such as location, echo pattern, coverage, intensity and trend, dimension, movement, tops and pertinent remarks. Because of the dynamic characteristics of thunderstorms, the need for update alerts should be emphasized.

6. FAA APPROVAL.

a. General. The guidance in this circular is intentionally general in nature and, as stated earlier, an airline should tailor its weather system to its operational requirements.

(1) The request for approval of the system required by FAR 121.101(d) should contain an overall description of the system, including how the system handles the considerations contained in paragraphs 4 and 5 of this circular. The request should also include:

(a) The personnel complement in the dispatch/meteorology office(s).

(b) A description of the air/ground communications system.

(c) A list of the weather teletype and facsimile circuits.

(2) Some domestic or flag air carriers may have flight operations that do not normally encounter specific weather hazards. The airline weather system should only be required to address those weather hazards their flightcrews may reasonably encounter.

(3) The determining issue in the approval of the airline weather system should be its ability to satisfactorily support the requirements of FAR 121.601.

b. Approval. The approval of an air carrier's weather system by the assigned FAA principal operations inspector should be in letter form.

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